Name_____

Date_____Block_____

Notes – FUNCTIONS – Intro Review

A **relation** is a set of ordered pairs (x,y).

- **Domain** – the x-values (or independent variable)
- **Range** – the y-values (or dependent variable)

P.S. In math notation, { } curly brackets can mean a set of objects.

Example 1: Find the domain and range of the relation { (2,5), (3, -2), (4,1), (2,3) }.

- The domain is D: {2 , 3 , 4} ← all the x-values
- The range is R: { -2, 1, 3, 5} ← all the y-values

*Notice that when you write the domain and range, you put the numbers in **order** from least to greatest and write each number only **once**.

YOU TRY!

Example 2: Give the domain and range for the relation { (-3,5), (2,8), (6,-4), (3,5) }

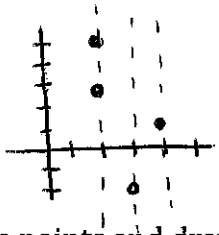
- D:
- R:

A **FUNCTION** is a special type of relation where every element in the domain is paired with only one element in the range.

- In other words, every x-value has exactly one y-value that it goes to.
- You can think about it like people walking down a path that splits. People are the domain, the x-values, and the two branches of the path are the range, or y-values. Each person (x) can only choose to walk down one branch of the path (y). However, more than one person (x) can choose the walk the same branch (y).

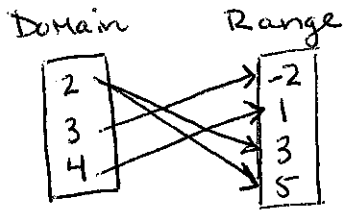
There are 2 formal ways to **test** whether or not something is a function. These are the vertical line test or a mapping diagram. Below, I've done both tests for Example 1 (earlier on this page).

Vertical line test



*Plot the points and draw a vertical line through each.
*If any line hits more than one point → NOT a function

Mapping Diagram



*The arrows connect an x-value with it's matching y-value for each point (x,y).
*If any number in the domain has more than one arrow coming from it →NOT a function.

YOU DO! For each test above, highlight what part of the diagram proves that this relation fails the test and is not a function.

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FUNCTION NOTATION

Function notation just means that instead of writing y=, we write $f(x) =$. They mean the same thing, we just write it differently.

"$f(x)$" is read out loud as "f of x". It means that you are plugging in x values and getting out $f(x)$ or y-values.

To evaluate a function for a given x-value, plug in the given number EVERYWHERE you see an "x".

Example 3: $f(x) = 2x^3 + 3x - 1$. Find $f(2)$.

- Find $f(2)$ is telling you to replace all of the x-values with 2 and simplify.

$$f(2) = 2(2)^3 + 3(2) - 1$$
$$= 2 \cdot 8 + 6 - 1$$
$$= 16 + 6 - 1$$
$$= 21$$

So $f(2) = 21$, and you're all done!

YOU DO: In the example above, highlight all the places where x was replaced with a 2.

Example 4: $f(x) = 4x^2 - 7x$. Find $f(3a)$.

- Find $f(2)$ is telling you to replace all of the x-values with 2 and simplify.

$$f(3a) = 4(3a)^2 - 7(3a)$$
$$= 4 \cdot 9a^2 - 21a$$
$$= 36a^2 - 21a$$

So $f(3a) = 36a^2 - 21a$, and you're all done!

YOU DO: In the example above, highlight all the places where x was replaced with 3a.

YOU TRY:

Example 5: $f(x) = 2x^2 - 4x + 5$. Find $f(-1)$. Show your work.

Example 6: $f(x) = 2x^3 + x - 4$. Find $f(3c)$. Show your work.